

Remarks

Claims 15-18 have been cancelled. Claims 1, 5, 8 and 12 have been amended. New claims 19-29 have been added. These amendments add no new matter to this application.

Claim 8 was objected to because the clean version of the claims in the last office action did not contain the phrase "said second electrode layer comprising Ni." Claim 8 has been amended to include this phrase. Accordingly, this objection should be withdrawn.

Claims 1-3, 5 and 15-18 stand rejected under 103(a) as being unpatentable over Okazaki in view of Teraguchi. Claims 15-18 have been cancelled. The rejection of claims 1-3 and 5 is respectfully traversed.

The Examiner states that Okazaki discloses a three level electrode structure "comprising, first, second and third electrode layers successively stacked. . ." Okazaki describes a three layer structure in which the first layer contains Ti, Mo, W, Mg or Au, the second layer contains Ti, Ni, Mo, W, Mg or Au and the third layer contains Pd, Sc, V, Zr, Hf, Ta, Rh, Ir, Co, Cu, Pt or W (See Okazaki, Col. 2, l. 47 – col. 3 l. 16).

Claim 1 has been to specify that the second electrode layer comprises Co. As described on page 14, lines 19-24 of the specification, it was found that a three layer electrode structure that contains Co as the second layer can provide superior electrical characteristics and adhesion strength. Okazaki does not describe an electrode structure in which the second layer includes Co. Okazaki also fails to disclose an electrode structure that uses Co in combination with Hf, Zr, Nb, Ta or Sc as claimed by applicants.

The Examiner relies upon Teraguchi to allegedly show that Ti in the first layer can be substitute with Sc, Ti, Nb, La and Ta. Ti is used in Okazaki as a first layer to improve adhesion between the electrode and the semiconductor layer (see Okazaki col. 3, ll. 6-9). The Examiner states that it would have been obvious to substitute Ti with Sc or Nb, because Teraguchi describes a layer that contains Ti, SC or Nb. However, the first

metal layer in Teraguchi is not formed to improve adhesion between the electrode and semiconductor as was the case in Okazaki. Rather, Teraguchi teaches that the metal selected for the first metal layer is chosen to maintain the stoichiometry on the surface of the nitride semiconductor (see Teraguchi col. 4, l. 50 - col. 5, l. 8). Teraguchi does not mention that these metals improve adhesion. Accordingly, it would not be obvious that the first Ti metal layer in Okazaki could be replaced by the metals used in the first metal layer described in Teraguchi.

Since neither Okazaki nor Teraguchi disclose a second electrode layer that includes Co and since it would not be obvious to use the metals described in Teraguchi in the first metal layer in Okazaki, the rejection of claim 1 should be withdrawn. The rejection of claims 2, 3 and 5, which depend from claim 1, should be withdrawn for at least the same reasons.

Claims 8-10 and 12 stand rejected under 35 USC 103(a) as being unpatentable over Okazaki and applicants Fig. 7. This rejection is respectfully traversed. In claim 8 applicants claimed an electrode structure that includes a first layer that includes Ti, Hf, Zr Nb, Ta or Sc, a second layer that includes Ni and a third layer that includes Au. The Examiner admits that Okazaki fails to disclose a third layer that includes Au as claimed by applicants. However, it is the Examiner's contention that it would be obvious to substitute the third layer in Okazaki that is made from Co with a layer made from Au.

The Au layer is used by applicants to improve adhesion of the layer during the wire bonding process (see specification p. 9, ll. 11-12). This function is accomplished in Okazaki by bonding pad 12, not by the Co layer. Accordingly, it would not be obvious to substitute the Co layer with an Au layer to improve adhesion as taught by applicants because these layers serve different purposes.

Further, Okazaki states that Au can be used in the first and second layer. Accordingly, Okazaki acknowledges that Au can be useful in some layers. However, despite the fact that Okazaki acknowledges that Au can be used in these other two layers,

Okazaki excludes Au from the third layer. Accordingly, it would not be obvious from Okazaki that Au can be used in the third layer as well, since it would have been listed in the list of metals useful for the third layer. For the forgoing reasons the rejection of claim 8 should be withdrawn. The rejection of claims 9, 10 and 12, which depend from claim 8, should be withdrawn for at least the same reasons.

New claim 19 is also patentable over the references cited by the Examiner.

Okazaki fails to disclose an electrode structure including a combination of Ni with Hf, Zr, Nb, Ta, or Sc as claimed in claim 19. Okazaki also does not teach a structure including a first layer containing Hf, Zr, Nb, Ta, or Sc and a second layer containing Ni and a third layer containing Au successively stacked on a nitride semiconductor layer.

Further, as explained above with respect to claim 1, it would not be obvious to substitute the first Ti layer in Okazaki with Sc, Nb or Ta as disclosed by Teraguchi because the first layer in Okazaki is used for a different purpose than the layer disclosed in Teraguchi. New claims 20-22, which depend from claim 19 are allowable for at least the same reasons.

Similarly, new claim 23 is also patentable over Okazaki and Teraguchi since Okazaki fails to disclose an electrode structure including a first layer containing Hf, a second layer containing Ni, Pd, or Co, and a third layer containing Au. Claims 24 and 25, which depend from claim 23, are patentable for at least the same reason.

Finally, new claim 27 is also patentable over Okazaki and Teraguchi. Claim 27 claims a first layer that includes Hf, Zr, Nb, Ta or Sc, and a Ga compound of Ni or Co, a second layer that includes Ni and a third layer that includes Au. Teraguchi does not disclose a Ga compound that includes Ni or Co. Further, Okazaki fails to disclose a layer including Ni or Co and Hf, Zr, Nb, Ta, or Sc. Therefore, new claim 27 should be patentable over Okazaki and Teraguchi. Claims 28 and 29, which depend from claim 27, are patentable for at least the same reasons.

For the foregoing reasons, a notice of allowance is solicited.

In the event that the transmittal letter is separated from this document and the Patent and Trademark Office determines that an extension and/or other relief is required, applicants petition for any required relief including extensions of time and authorize the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 03-1952** referencing docket no. **245402001600.**

Respectfully submitted,

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By:



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